Chatwin

POLYGON TOOL BOX

THE parts illustrated on this page have been produced entirely by turning operations on lathes fitted with the Chatwin Patent Polygon Tool Box. Produced in a very much faster time than by milling, with a better finish and a complete absence of fraze, they represent only a few of the production possibilities of this revolutionary new tool. With the Polygon Tool Box in your machine shop you can :

By using the appropriate cam—

Produce hexagon, octagon, square or other shapes from round stock, drilled and finished in ONE OPERATION ready for parting from the bar.

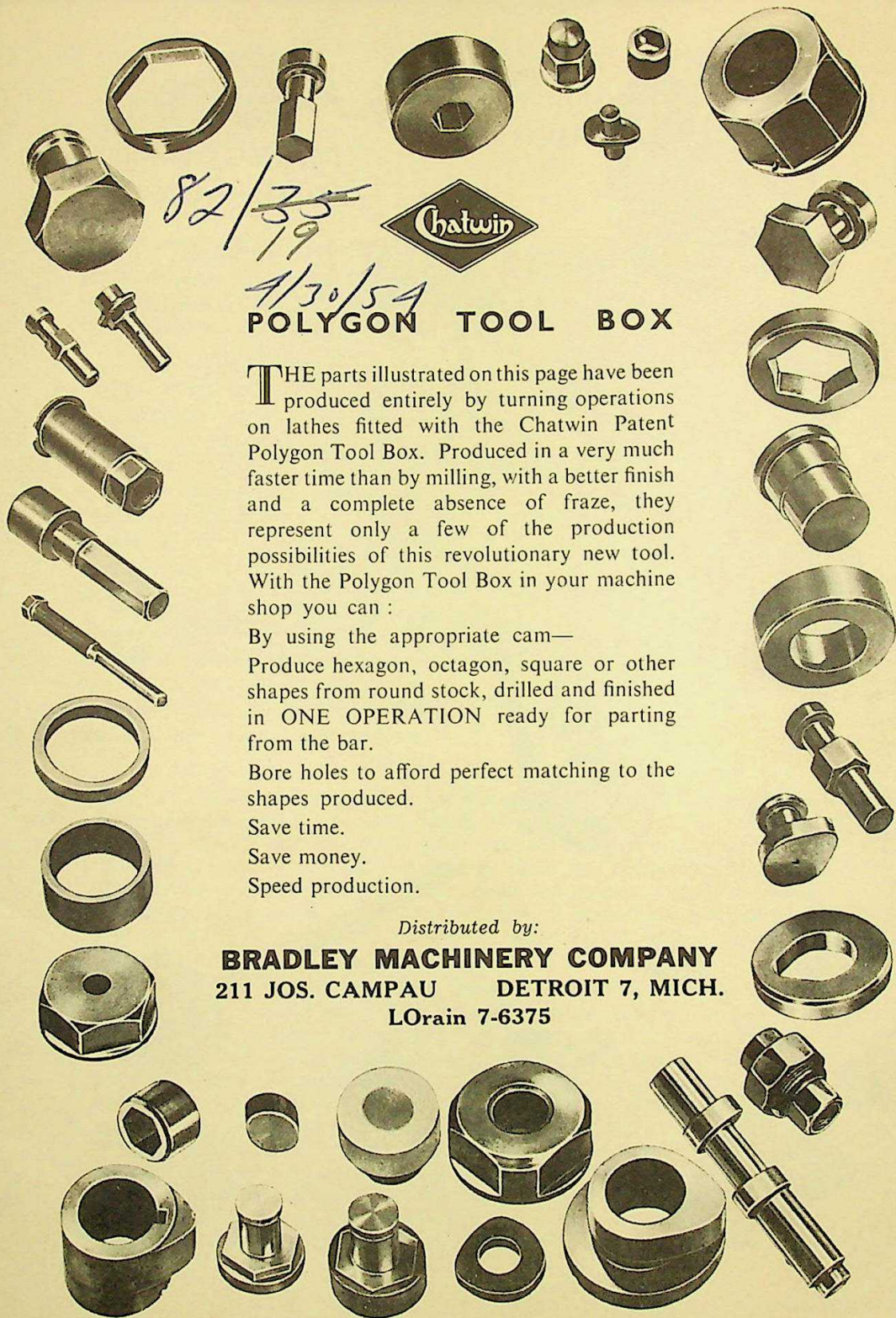Bore holes to afford perfect matching to the shapes produced.

Save time.

Save money.

Speed production.

Distributed by:

BRADLEY MACHINERY COMPANY
**211 JOS. CAMPAU   DETROIT 7, MICH.**
LOrain 7-6375

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POLYGON
TOOL BOX

THE illustrations of Chatwin Patent Polygon Tool Boxes on this page indicate part of the comprehensive range of Capstan, Turret and Automatic Boxes.

Boxes 1 and 2 are for use on capstan and automatic lathes. Boxes 3 and 5 have been developed for turret lathes. Box 4 meets the need for a box which will form shapes behind shoulders and is for use on capstan lathes ; without the swivel it may be used as a standard box. Boxes 6 to 12 indicate a few of the types available for Automatic machines.
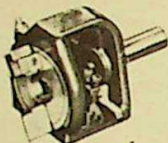
There are Polygon Boxes suitable for most types of lathe, and others can be developed to meet individual requirements. Your enquiries are invited.
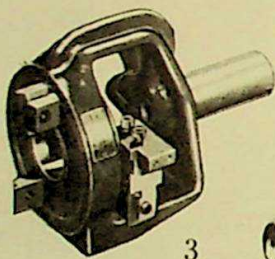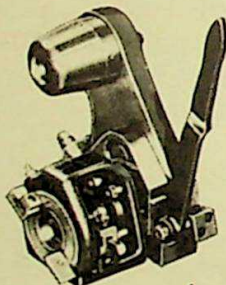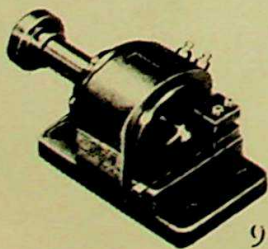
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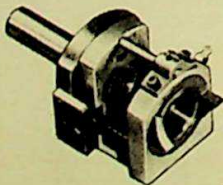
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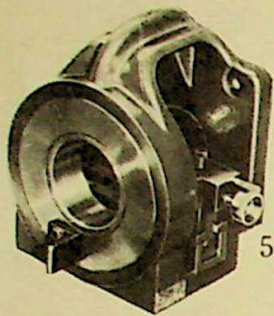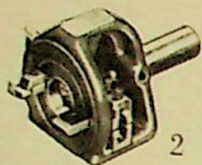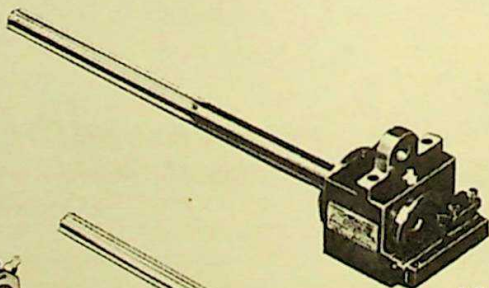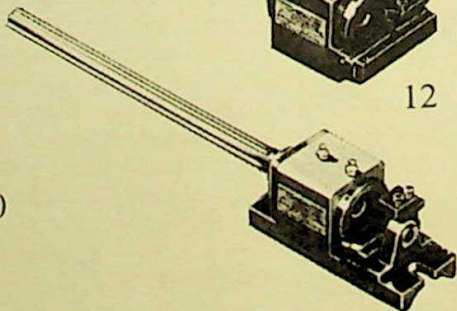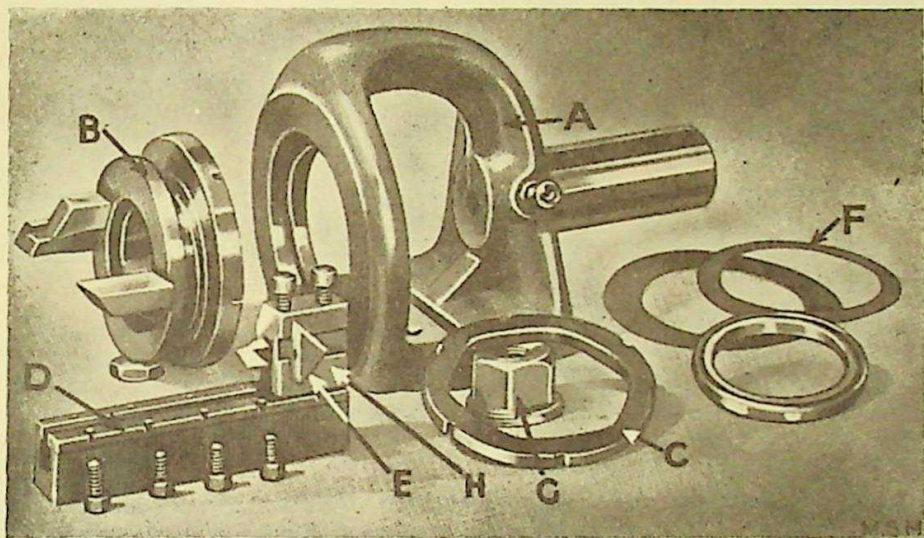
The Chatwin Polygonal Tool Box dismantled showing :—the body *A*, cam holder *B*, cam *C*, bottom slide *D*, cam-follower *E*, the bronze washers *F*, a finished workpiece *G*, and top slide *H*.

The Chatwin Patent Polygon Tool Box was developed in 1944 for the purpose of turning hexagonal, octagonal, square, or any irregular shapes within its capacity, quickly and free from fraze and burrs, thereby eliminating the necessity for subsequent milling operations. Since that time, boxes have been developed to suit most types of capstan, turret and automatic lathes, and other interesting developments include the production of internal and external taper and the boring of polygon shaped holes to afford perfect mating to external shapes produced on the same box.

Briefly, the box comprises a holder for a tool which can slide transversely under the control of a rotary cam that is journalled in the body of the box. On capstan and turret lathes, the cam is driven by the lathe spindle and its shape corresponds with the square, hexagon or other form to be turned on the work; on multi-spindle automatics the cam is driven from the rear by means of a coupling or shaft connected to the rear gear box. A typical tool box for capstan and turret lathes is shown dismantled in the illustration on this page. The rear part of the body A has a shank to suit the lathe turret, while the front is bored to receive a rotary holder B for the cam C. The front and back parts of the body are connected by a bottom wall and a sturdy bridge, the former being machined to receive a guideway D in which the top slide H can slide. The cam holder is mounted in a large diameter ball bearing which takes the
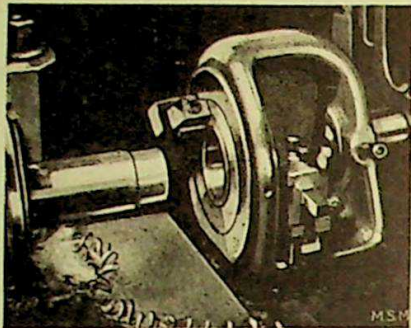
The Polygon Tool Box in use.
Above. The round bar about to enter the box
prior to turning a hexagon on it.
To the right. The hexagon completely turned
on the end of the bar.
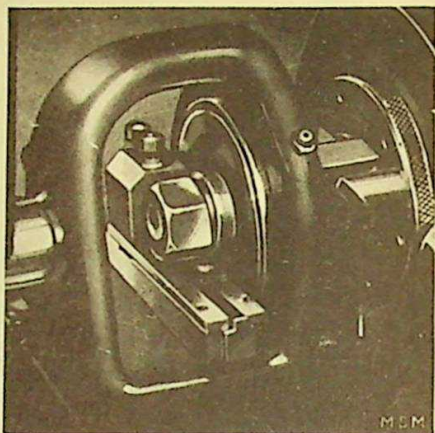
axial load of the cam, and is held in place by a ring nut. There is a negligible amount of end thrust on the cam holder which is prevented from rotating too freely by the two hard bronze crimped washers F which fit between the front part of the body and the ring nut and cam holder proper. A driver seen on the cam holder is contacted by a catch pin on the nose of the lathe spindle for rotation of the holder and cam.

Cams are interchangeable to suit the number of flats to be cut and the size across the flats. They are of hardened steel, and the internal cam surface is ground to a special high finish. The follower consists of a triangular block of hardened steel having a dovetailed tang which fits into a tapered dovetailed groove in the tool-holder (top slide).

In use the workpiece is turned in the ordinary way to the size across the corners, and then the polygonal turning box is fed along it. The cam is rotated and causes the tool-holder (top slide) with its cutter to reciprocate, the amplitude of this movement depending upon the difference in the respective diameters across the corners and flats of the work. The cam urges the tool inwards while a spring in the tool-holder (top slide) slide urges it out-wards. The tool-holder (top slide) is lapped into the bottom slide to promote a smooth action.

The standard tool bit is ground as a knife tool.

The tool box can hold a drill so that work can be drilled at the same time as the polygon shape is being turned. Polygon-shaped holes to afford perfect matching to external shapes produced are bored by using the same cam that turns the external shape.

The changeover for any operation takes only a few minutes and as the shape is produced in sequence with the other operations on the component in the lathe, the time which would be lost by transferring the work to another type of machine is eliminated. Examples of production are: a $\frac{3}{4}''$ mild-steel Whitworth hexagon nut can be produced in 27 seconds' actual cutting time at a spindle speed of 280 r.p.m.; an octagon nut on a union, measuring $\frac{7}{8}''$ across the flats and $\frac{1}{2}''$ long, can be produced in nine seconds' machining time.
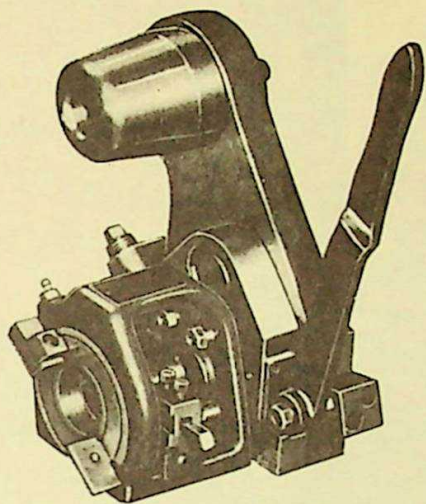
POLYGON TOOL BOX

SWIVEL TYPE

This model has been designed to meet the need for a Polygon Box which will form shapes behind shoulders.

The Box has been mounted on a swivelling slide which fits on to the face of the turret, or can be fitted with a standard shank. A spring forces the Box about $\frac{1}{8}''$ out of centre ; in this position the tool will pass over the bar without cutting. When the Box has been brought into the position required, the lever is pulled over, operating a cam on the opposite side of the Box to the spring, thus swinging the Box into centre.

If the shape required is a short one, then a flat tool can be used for cutting the shape as the Box reaches the centre ; the handle can then be released, the Box swung out of centre, and withdrawn from the bar. If the shape is too long for a flat tool to operate, then a standard tool should be used, the Box swung into centre and the traverse engaged ; when the required length of shape has been cut, the traverse is disengaged, the Box allowed to swing out of centre and withdrawn from the bar.

The whole operation can be carried out without stopping the lathe.

A Polygon Box fitted to a 1½″ capstan lathe turns a hexagon in an exceptionally short time.   The finished product will be free from fraze and machined to very close limits.
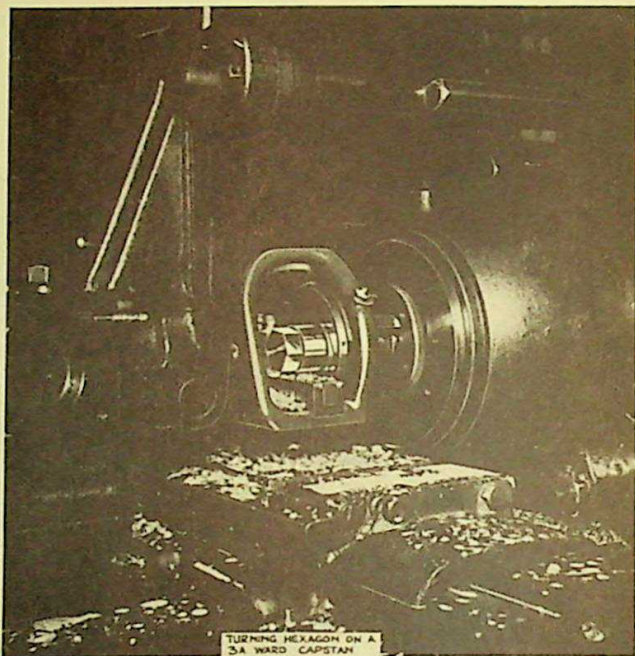
TURNING HEXAGON ON A 3A WARD CAPSTAN

The same box as above is shown boring the matching part.

BORING HEXAGON ON A 3A WARD CAPSTAN

POLYGON TOOL BOX
OPERATIONS ILLUSTRATED

A Polygon Box fitted to a B. & S. 2G Automatic and a few of the parts produced. At the time this picture was taken 10,000 nuts had been produced, the cycle time being 42 seconds.

TURNING HEXAGON ON A 2G BROWN & SHARPE AUTO
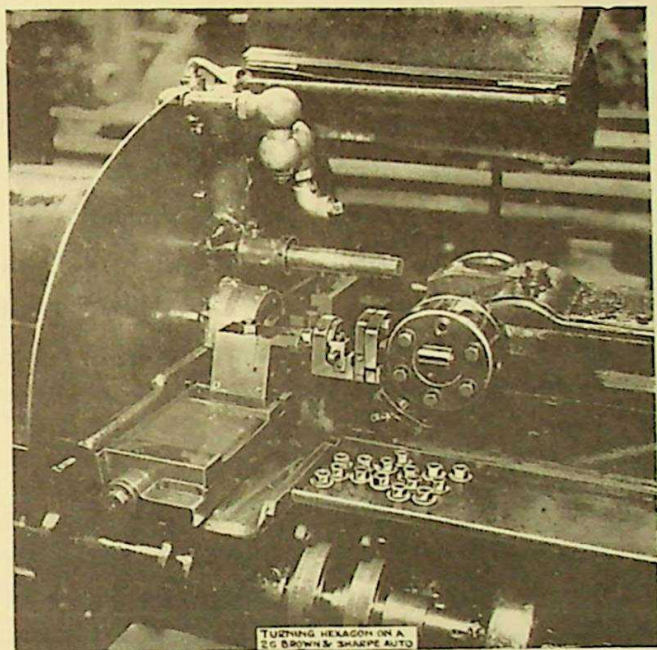
A Polygon Box at work on a R.A. $\frac{9}{16}$" six spindle Acme Grindley Automatic Machine putting the square on the end of a small valve spindle. This Box was running at 1,200 revs. when the picture was taken.
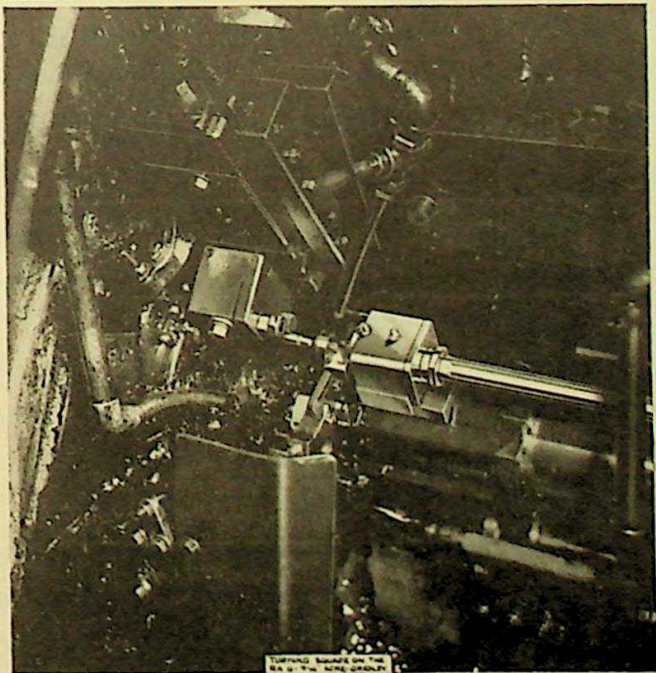
TURNING SQUARE ON THE END OF THE VALVE SPINDLE

Driving the Box

The Box is operated by a driver fitted to the nose of the lathe—except on multi-spindle automatics, where it is driven from the rear by means of a coupling shaft connected to the rear gear box. Many lathes have a small hole tapped into the collet front plate into which can be screwed a stud to act as a driver to the Box. This acts in the same way as a driver on a centre lathe driving a carrier. On capstan lathes, it revolves the front spinner which carries the cam, and on automatic lathes it is driven from the rear.

Operation of the Cam

The cam is so formed that it will generate the shape required. An operating finger or cam-follower bears against the cam face and is kept there by spring pressure. As the cam revolves, it forces the slide inwards towards the centre of the work, and the spring pushes it outwards. When the Box is brought up to the work in the lathe, it revolves the spinner and the cam rotates to control the movement of the slide. The traverse of the machine is then engaged and the Box travels along the work.

Grinding the Tool

The Tool Box is fitted with a square standard tool bit. The front face of the tool is ground as an ordinary knife turning-tool, and turns the flat sides as the work proceeds into the box.

The grinding of the tool is not critical, but it is recommended that it be carried out in accordance with the detailed drawing shown overleaf, and preferably on a cutter-grinder. It should be ground to an angle slightly greater than the angle of the piece to be produced. For example: in producing a hexagon (each side of which has an angle of 30° from the centre line) the tool is ground to an angle of 32°. This gives 30° to clear the angle of the hexagon and 2° cutting clearance.

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REMOVE CAM
THUS
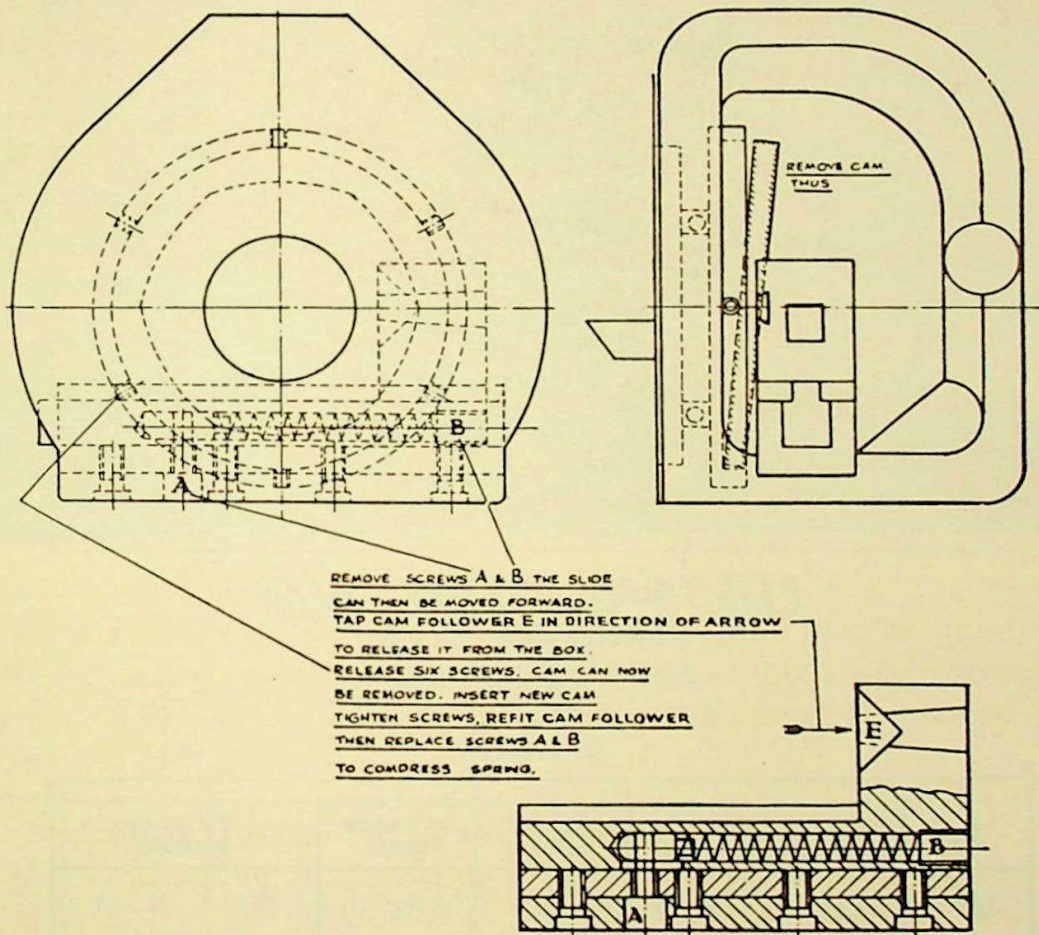
REMOVE SCREWS A & B THE SLIDE
CAN THEN BE MOVED FORWARD.
TAP CAM FOLLOWER E IN DIRECTION OF ARROW
TO RELEASE IT FROM THE BOX.
RELEASE SIX SCREWS, CAM CAN NOW
BE REMOVED. INSERT NEW CAM
TIGHTEN SCREWS, REFIT CAM FOLLOWER
THEN REPLACE SCREWS A & B
TO COMPRESS SPRING.

TO CHANGE CAM

CAMS MAY BE CHANGED SWIFTLY AND
EASILY BY FOLLOWING PROCEDURE
ILLUSTRATED ABOVE.
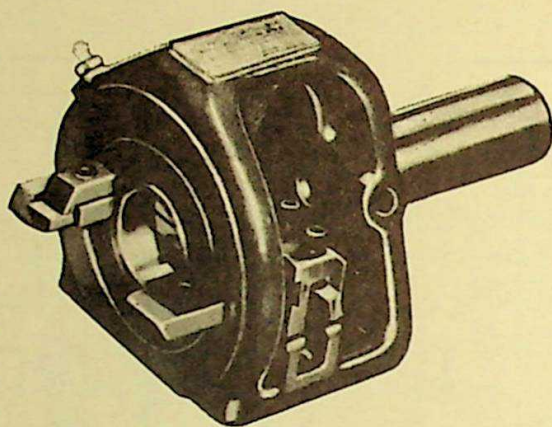
POLYGON TOOL BOX
STANDARD TYPE

CAPACITY

Size	Max. Bar Diameter	Max. Hex. A/Flats	Max. Sq. A/Flats	Max. Length of Largest Shape	To fit on Machine
No. 1	$1\frac{1}{4}''$	·915''	$1\frac{1}{16}''$	$1\frac{3}{8}''$	
No. 2	$1\frac{3}{4}''$	1·386''	1·352''	$1\frac{1}{2}''$	LATHES,
No. 3	$2\frac{5}{8}''$	2·220''	$1\frac{7}{8}''$	$2\frac{3}{8}''$	TURRET

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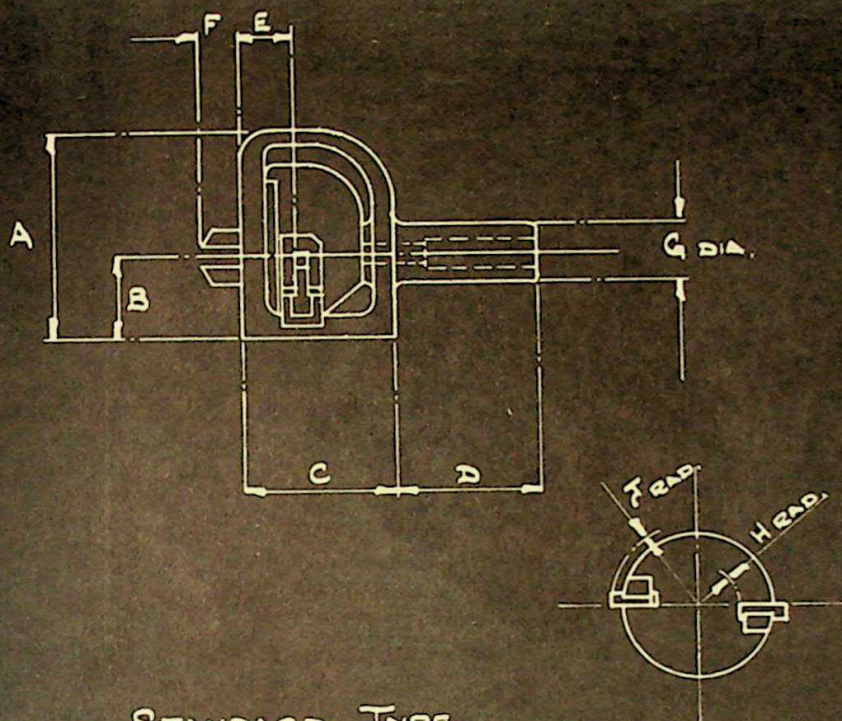
STANDARD TYPE

POLYGON TOOL BOX

STANDARD TYPE

Size	A	B	C	D	E	F	G	H	J
No. 1	$4\frac{5}{8}''$	$1\frac{13}{16}''$	$3\frac{9}{16}''$	$3\frac{3}{16}''$	$1\frac{3}{8}''$	$1\frac{7}{32}''$	$1''$	$\frac{11}{16}''$	$1\frac{13}{16}''$
No. 2	$5\frac{5}{16}''$	$2\frac{1}{8}''$	$3\frac{11}{16}''$	$3\frac{1}{2}''$	$1\frac{3}{8}''$	$1\frac{7}{32}''$	$1\frac{1}{2}''$	$1\frac{1}{32}''$	$2\frac{3}{16}''$
No. 3	$9''$	$3\frac{3}{4}''$	$6\frac{3}{16}''$	$4\frac{5}{8}''$	$2\frac{17}{32}''$	$2\frac{1}{8}''$	$2\frac{1}{8}''$	$1\frac{7}{16}''$	$3\frac{9}{32}''$
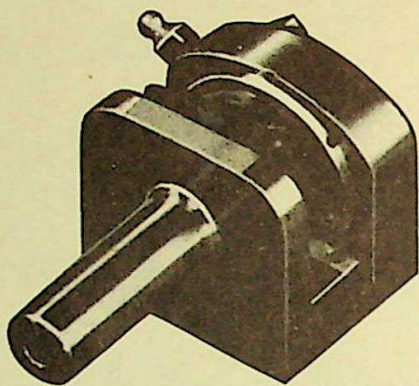
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POLYGON TOOL BOX
AUTOMATIC MACHINE TYPE

CAPACITY

Size	Max. Bar Diameter	Max. Hex. A/Flats	Max. Sq. A/Flats	Max. Length of Largest Shape	To fit Single Spindle Auto.
29	$\frac{3}{8}''$	$\frac{5}{16}''$	$\frac{5}{16}''$	$\frac{3}{8}''$	Brown & Sharpe "00"
30	$\frac{5}{8}''$	$1\frac{7}{32}''$	$1\frac{7}{32}''$	$\frac{7}{16}''$	Brown & Sharpe "OG"
31	$1''$	·860″	·860″	$2\frac{7}{32}''$	Brown & Sharpe "2G"
31A	$1\frac{1}{8}''$	·966″	·966″	$2\frac{7}{32}''$	Index 52

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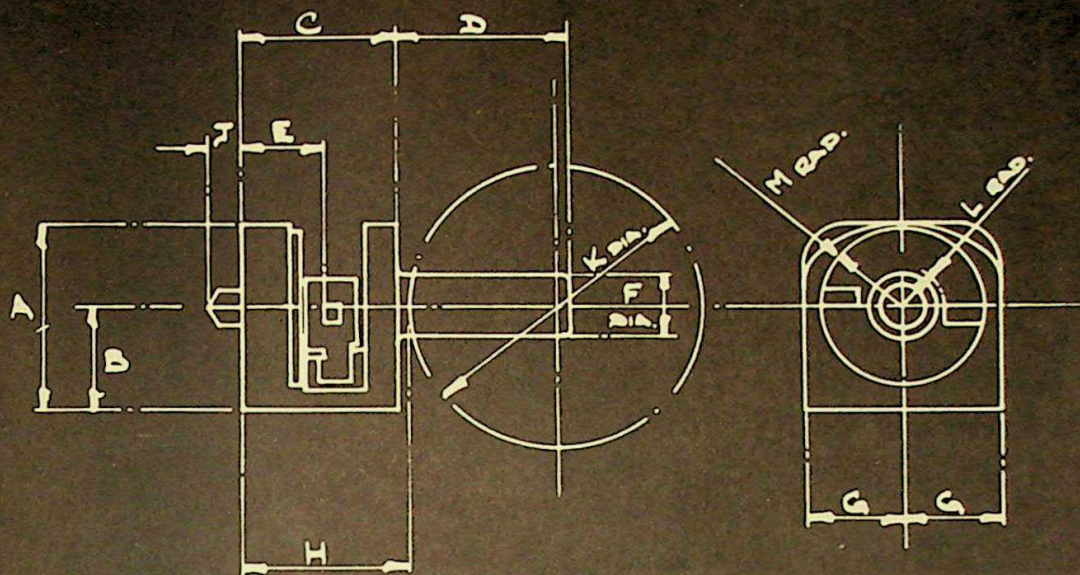
AUTOMATIC MACHINE TYPE

POLYGON TOOL BOX

AUTOMATIC MACHINE TYPE

Size	A	B	C	D	E	F	G	H	J	K	L	M
29	$1\frac{3}{4}''$	$1''$	$1\frac{17}{32}''$	$1\frac{31}{32}''$	$\frac{7}{8}''$	$\frac{5}{8}''$	$1\frac{3}{16}''$	$1\frac{31}{32}''$	$\frac{9}{32}''$	$3\frac{3}{8}''$	$\frac{3}{8}''$	$2\frac{1}{32}''$
30	$2\frac{1}{4}''$	$1\frac{1}{4}''$	$1\frac{13}{16}''$	$2''$	$\frac{31}{32}''$	$\frac{3}{4}''$	$1\frac{1}{8}''$	$1\frac{15}{16}''$	$\frac{3}{8}''$	$4\frac{1}{16}''$	$\frac{1}{2}''$	$1\frac{15}{16}''$
31	$2\frac{3}{4}''$	$1\frac{7}{16}''$	$2\frac{3}{4}''$	$3''$	$1\frac{3}{16}''$	$1''$	$1\frac{1}{4}''$	$2\frac{7}{8}''$	$\frac{3}{8}''$	$5''$	$1\frac{3}{16}''$	$1\frac{1}{16}''$
31A	$3\frac{1}{8}''$	$1\frac{11}{16}''$	$2\frac{31}{32}''$	$3''$	$1\frac{3}{16}''$	$1''$	$1\frac{5}{8}''$	$2\frac{7}{8}''$	$\frac{5}{8}''$	$5\frac{1}{2}''$	$\frac{27}{32}''$	$1\frac{7}{32}''$

POLYGON TOOL BOX

AUTOMATIC MACHINE : SWIVEL TYPE

CAPACITY

Size	Max. Bar. Diameter	Max. Hex. A/Flats	Max. Sq. A/Flats	Max. Length of Largest Shape	To fit Single ; Spindle Auto.
32	$\frac{7}{8}''$	0.750″	0.750″	$\frac{13}{16}''$	Index 24 Brown & Sharpe " 2G "
33	$1\frac{1}{8}''$	0.966″	0.966	$\frac{13}{16}''$	Brown & Sharpe "OG"
34	$\frac{1}{4}''$	0.216″	0.216″	$\frac{3}{8}''$	Brown & Sharpe "00G"

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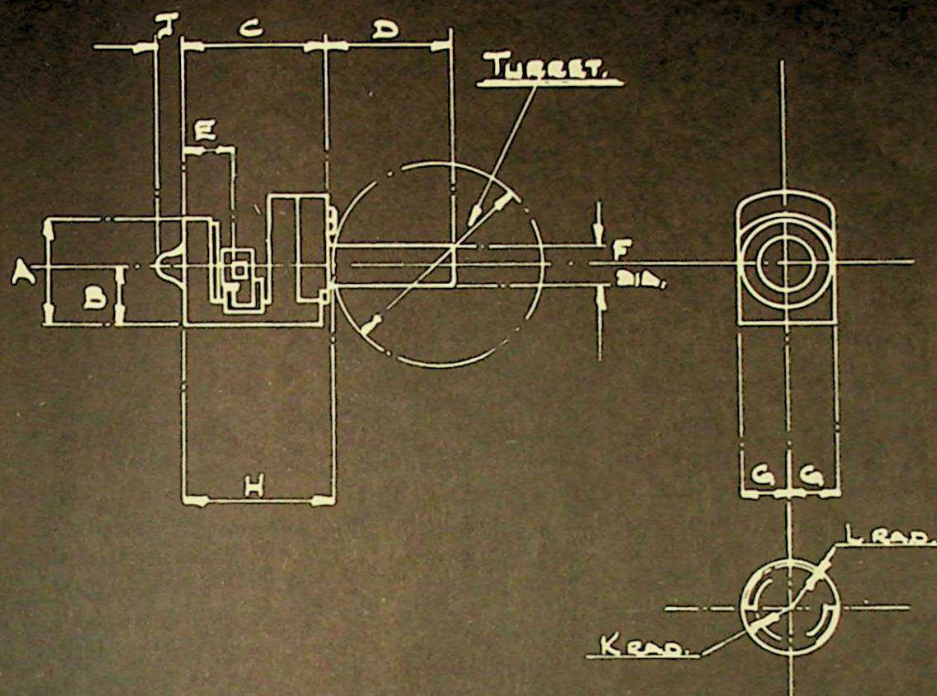
AUTOMATIC MACHINE. SWIVEL TYPE.

POLYGON TOOL BOX

AUTOMATIC MACHINE : SWIVEL TYPE

Size	A	B	C	D	E	F	G	H	J	K	L
32	$2\frac{5}{8}''$	$1\frac{7}{16}''$	$3\frac{7}{16}''$	$3''$	$1\frac{3}{16}''$	$1''$	$1\frac{7}{16}''$	$3\frac{9}{16}''$	$\frac{3}{8}''$	$\frac{13}{16}''$	$1\frac{1}{16}''$
33	$3\frac{1}{8}''$	$1\frac{11}{16}''$	$3\frac{7}{32}''$	$3''$	$1\frac{3}{16}''$	$1''$	$1\frac{3}{8}''$	$3\frac{11}{32}''$	$\frac{5}{8}''$	$\frac{15}{16}''$	$1\frac{7}{32}''$
34	$1\frac{3}{4}''$	$1''$	$2\frac{3}{16}''$	$2''$	$\frac{13}{16}''$	$\frac{5}{8}''$	$\frac{13}{16}''$	$2\frac{1}{4}''$	$\frac{9}{32}''$	$\frac{3}{8}''$	$\frac{5}{8}''$
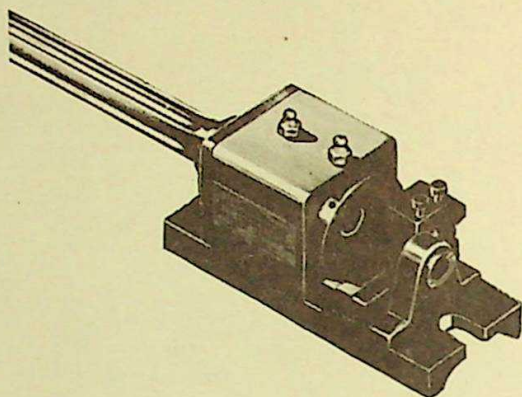
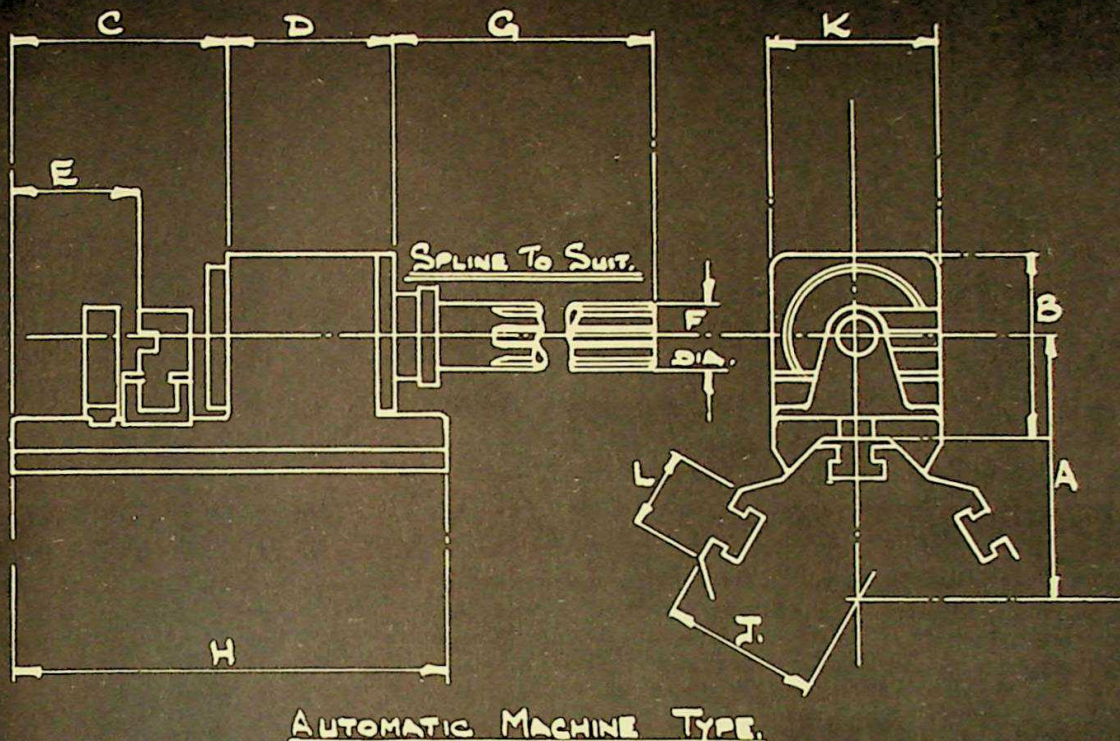Chatwin

POLYGON TOOL BOX

AUTOMATIC MACHINE TYPE

CAPACITY

Size	Max. Bar Diameter	Max. Hex. A/Flats	Max. Sq. A/Flats	Max. Length of Largest Shape	To fit on Machine
43	$\frac{9}{16}''$	$\frac{31}{64}''$	$\frac{31}{64}''$	$1\frac{3}{4}''$	Acme-Gridley RA6–$\frac{9}{16}''$
44	$1\frac{1}{4}''$	.915″	$1\frac{1}{16}''$	$1\frac{3}{32}''$	Acme-Gridley RA6–$1\frac{1}{4}''$
45	$1\frac{5}{8}''$	1.386″	1.386″	$1\frac{7}{8}''$	Acme-Gridley RA6–$1\frac{5}{8}''$
46	$2\frac{5}{8}''$	2.165″	2.165″	$1\frac{13}{16}''$	Acme-Gridley RA6–$2\frac{5}{8}''$
47	$\frac{7}{8}''$	.750″	.750″	$1\frac{1}{8}''$	Gridley R4–$\frac{7}{8}''$
48					
49	$1\frac{5}{8}''$	1.300″	1.300″	$1\frac{5}{16}''$	Gridley R6–$1\frac{5}{8}''$

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AUTOMATIC MACHINE TYPE.

POLYGON TOOL BOX
AUTOMATIC MACHINE TYPE

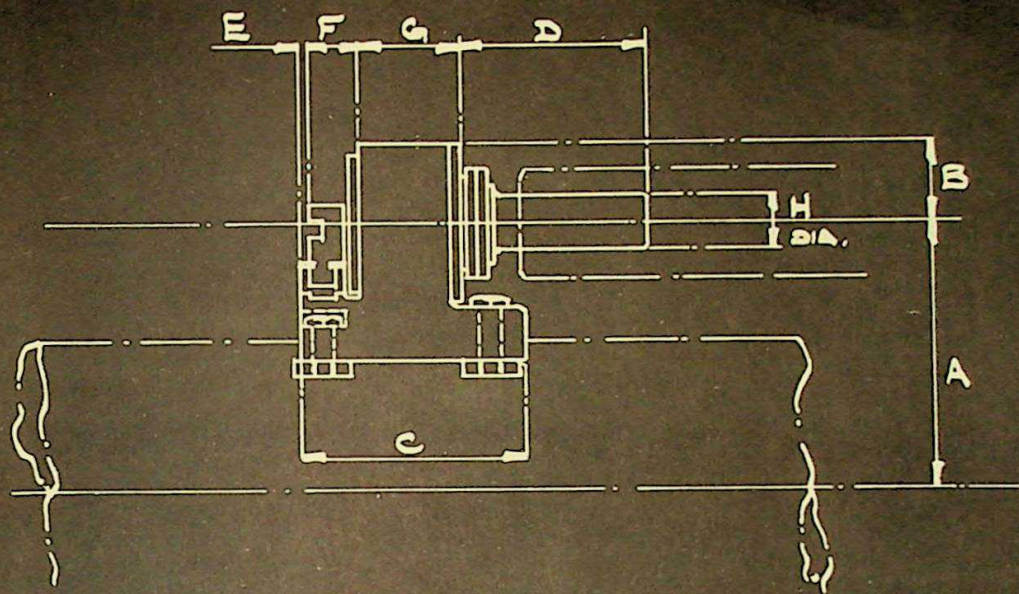| Size	A	B	C	D	E	F	G	H	J	K	L
43	4.0″	$2\frac{25}{32}″$	$2\frac{7}{8}″$	$2\frac{15}{32}″$	$1\frac{21}{32}″$	.862″	13″	$6\frac{5}{16}″$	2.532″	$2\frac{1}{2}″$	1.123″
44	5.50″	$3\frac{5}{8}″$	$3\frac{3}{16}″$	$2\frac{13}{16}″$	$2\frac{1}{16}″$	1.00″	$13\frac{5}{8}″$	7″	3.523″	$3\frac{3}{8}″$	1.438″
45	7.00″	$4\frac{3}{4}″$	$2\frac{11}{16}″$	$2\frac{1}{2}″$	$1\frac{3}{16}″$	—	—	$6\frac{1}{2}″$	4.500″	$4\frac{3}{8}″$	—
46	7.375″	$5\frac{7}{8}″$	$3\frac{3}{16}″$	$3\frac{1}{2}″$	$1\frac{1}{4}″$	—	—	$8\frac{1}{4}″$	4.375″	$5\frac{11}{16}″$	—
47	4.00″	$2\frac{29}{32}″$	$2\frac{1}{2}″$	$2\frac{15}{32}″$	$1\frac{5}{16}″$	—	—	$5\frac{15}{16}″$	2.532″	$2\frac{7}{8}″$	1.123″
48											
49	6.50″	$3\frac{7}{8}″$	$3\frac{9}{16}″$	$2\frac{13}{16}″$	$1\frac{13}{16}″$	—	—	7″	4.522″	$3\frac{3}{4}″$	1.438″
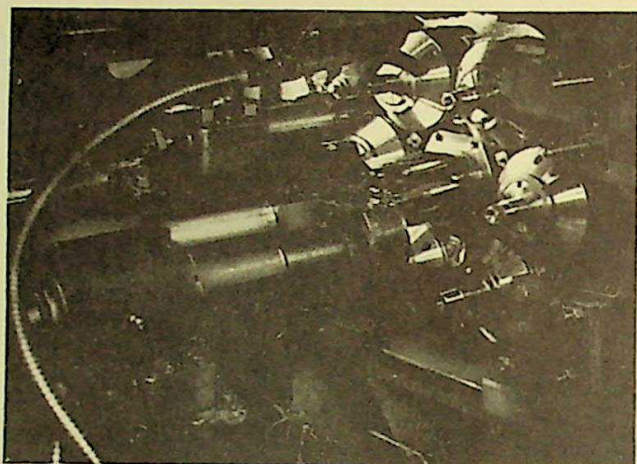
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POLYGON TOOL BOX
CONE AUTOMATIC MACHINE TYPE
CAPACITY

Size	Max. Bar. Diameter	Max. Hex. A/Flats	Max. Sq. A/Flats	Max. Length of Largest Shape	To fit Multi-Spindle Auto.
51	$1\frac{5}{8}''$	1.398"	1.398"	2"	$1\frac{1}{2}''$ Six Spindle
52	$1\frac{5}{8}''$	1.398"	1.398"	2"	$1\frac{1}{2}''$ Four Spindle
53	2"	1.732"	1.732"	$3\frac{1}{2}''$	2"–4 Spindle
54					
121	$1\frac{1}{2}''$	1.299"	1.299"	2"	$1\frac{1}{2}''$–4 Spindle
122	$1\frac{1}{2}''$	1.299"	1.299"	2"	$1\frac{1}{4}''$–8 Spindle

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CONE AUTOMATIC MACHINE TYPE

POLYGON TOOL BOX
CONE AUTOMATIC MACHINE TYPE

Size	A	B	C	D	E	F	G	H
51	6.000″	$1\frac{13}{16}″$	$4\frac{7}{8}″$	$4″$	$\frac{3}{16}″$	$1\frac{1}{8}″$	$2\frac{1}{4}″$	$1\frac{1}{4}″$
52	—	$1\frac{13}{16}″$	$4\frac{7}{8}″$	$4″$	$\frac{3}{16}″$	$1\frac{1}{8}″$	$2\frac{1}{4}″$	$1\frac{1}{4}″$
53	—	$3″$	$9″$	$3\frac{1}{8}″$	$1\frac{1}{4}″$	$2\frac{1}{16}″$	$3\frac{5}{8}″$	$1\frac{3}{4}″$
54								
121	—	$1\frac{13}{16}″$	$4\frac{7}{8}″$	$4″$	$\frac{3}{16}″$	$1\frac{1}{8}″$	$2\frac{1}{4}″$	$1\frac{1}{4}″$
122	—	$1\frac{13}{16}″$	$4\frac{7}{8}″$	$4″$	$\frac{3}{16}″$	$1\frac{1}{8}″$	$2\frac{1}{4}″$	$1\frac{1}{4}″$

Chatwin